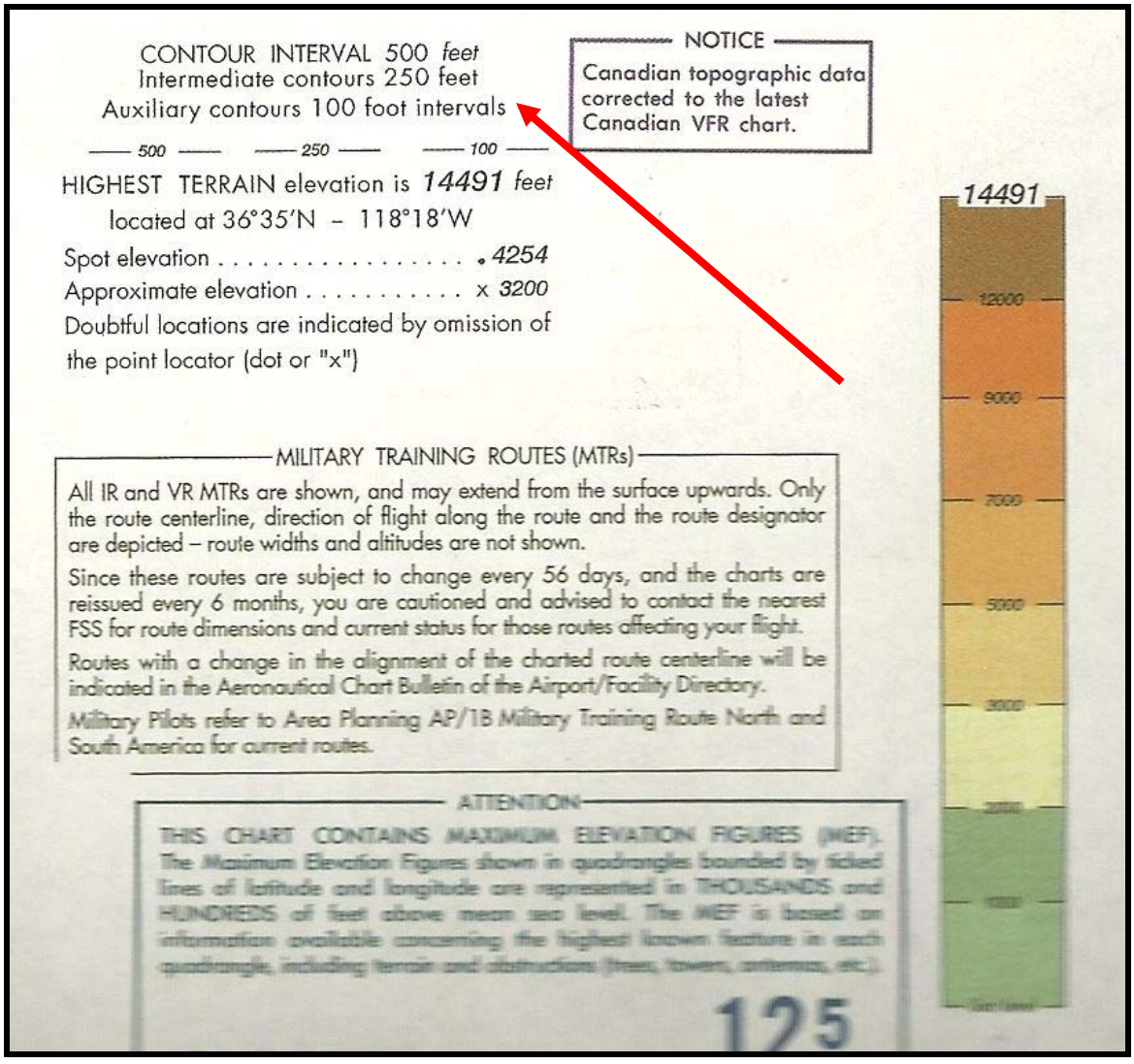
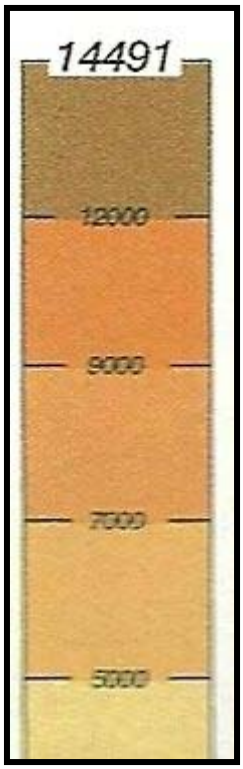
Reading Aeronautical Charts in the Great Basin

The charts commonly used in the United States for VFR navigation, day or night, are known as “sectional” charts. While their format is generally consistent with those of VFR aeronautical charts the world over, and in any event their format is identical regardless of what parts of the United States they cover, the unique features of the Great Basin make it worthwhile to draw special attention to certain features of these charts.

To begin with, the contour interval (the vertical separation between adjacent contour lines) is 500 feet—period. The legend printed on every sectional chart makes provision for “intermediate” “and auxiliary” contour lines, but the tremendous terrain relief in the Great Basin—more than 10,000 feet or 3,000 meters between high and low points—makes these unnecessary.





The contour maps with which most of us are most familiar are the USGS topographic quadrangles we use for hiking. On these maps, broad areas of color are used to depict the presence or absence of vegetation, and most of us subconsciously approach sectional charts with this idea still in mind. **The broad areas of color on sectional charts depict one thing only—terrain elevation.**

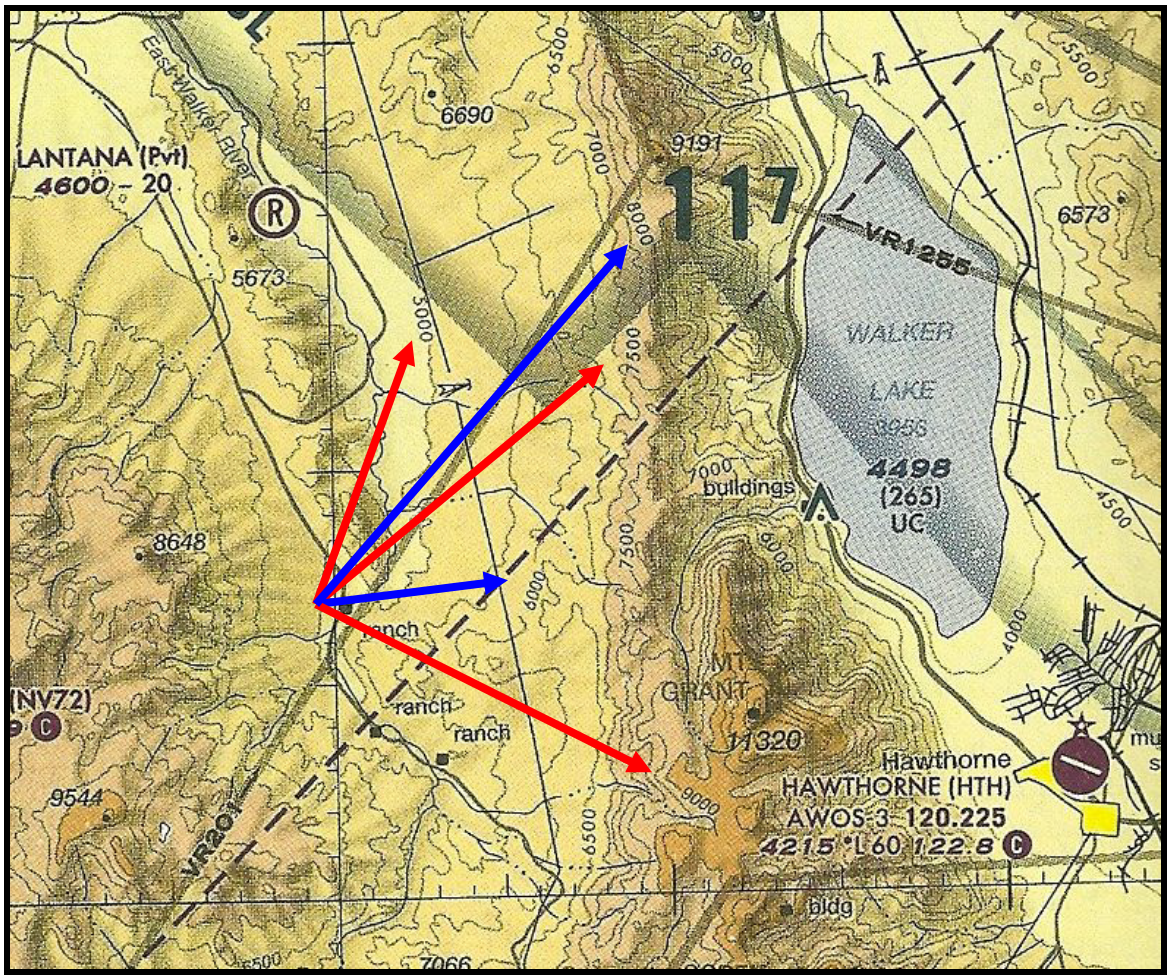
At the left of these words is a sample portion of the color table reproduced from the sectional legend panel. Notice that colors depict elevations only, nothing else. There is no reference to vegetation anywhere on a sectional chart--with the single exception of marshland, not a major consideration here in the Great Basin!

Also, notice that in the range of elevations most useful to us while soaring in the Great Basin, these **color changes occur at odd thousands**—that is, at **5,000, 7,000 and 9,000 feet** above sea level.

There are two exceptions to the statement that broad areas of color depict only terrain elevation: the first is that solid yellow is used to depict intensely built-up or urban areas on sectional charts. This is because sectional charts are designed for use under VFR conditions—day OR night. A night, the areas depicted with the yellow color appear bright against the darker field of the surface, because of plentiful electric lighting in these areas. During daylight hours, however, these yellow areas are helpful for navigation in our gliders because they highlight the general shapes of the built-up areas or cities. Bear in mind that because of the solid yellow tint, however, there is no contour information available for the surface within those yellow regions; the contour lines aren't drawn through them, regardless of the actual slope at the surface.

The second exception is that solid blue is used to depict lakes and streams. Of course, the shoreline of any lake is also a contour line; in some cases the elevation of the water surface is shown on the sectional...be forewarned that lake levels in the desert fluctuate wildly from year to year. By the same token, "dry" lakes aren't alway dry!

To illustrate the manner in which colors are used to highlight elevations, here is a sample taken from the sectional covering the area just west of Walker Lake:



Notice that the color changes occur at **odd** thousands (in this example, 5,000, 7,000 and 9,000 feet msl, indicated by **red** arrows) but not at **even** thousands, such as the 6,000- and 8,000-ft contour lines indicated by the **blue** arrows.

As you can see, this makes the even-thousand contours much less prominent than their odd-thousand counterparts. This should be kept in mind when trying to quickly determine the elevation of unmarked locations such as dry lake beds or fields where outlandings may be necessary.

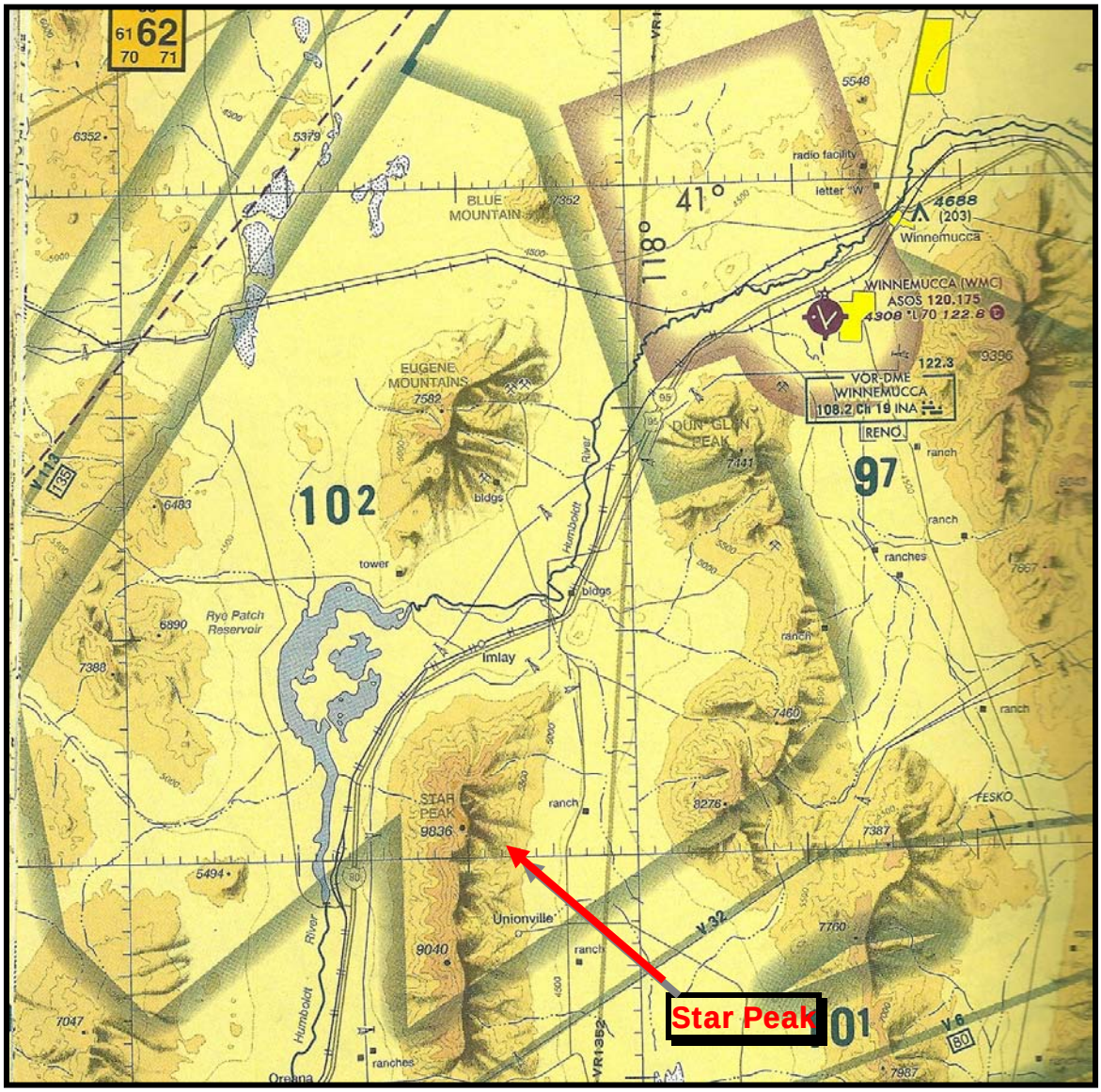
Remember to always count down from the nearest odd-thousand contour line; this will preclude discovering the hard way that a dry lake bed is higher than you thought!

Look at the closely-packed contour lines on the northeastern flank of Mt. Grant, where the hillside tumbles down toward Walker Lake. Because contour lines are a fixed vertical distance apart (500 feet on a Great Basin sectional), the more closely these lines approach one another the steeper the terrain they represent. Therefore, a dense mass of contour lines should automatically suggest to you a steep slope. The sectional chart draws our attention to the steep eastern slope of Mt. Grant in another manner: the dark gray shading ("shadow") does this. In this example, the eastern slopes are significantly steeper than the western slopes of the same mountain, so we wouldn't expect these shadow areas to appear on the western slopes of Mt. Grant.

However, this isn't actually the reason there is no shading on the western slopes of Mt. Grant—or indeed, on the western slopes of any high terrain! The shadows are depicted in accorfance with an old drafting convention that positions the sun at the upper left corner of the drawing or chart. Specifically, the conventional location of the sun on a chart is at an azimuth of 315 degrees true, 45 degrees above the horizon. So, in order for a slope to be depicted with a shadow, it must be steep enough to have at least 45 degrees of slope. it also must be facing at least partially toward the southeast. **West-facing slopes, regardless of how steep they are, are never depicted with shading!**

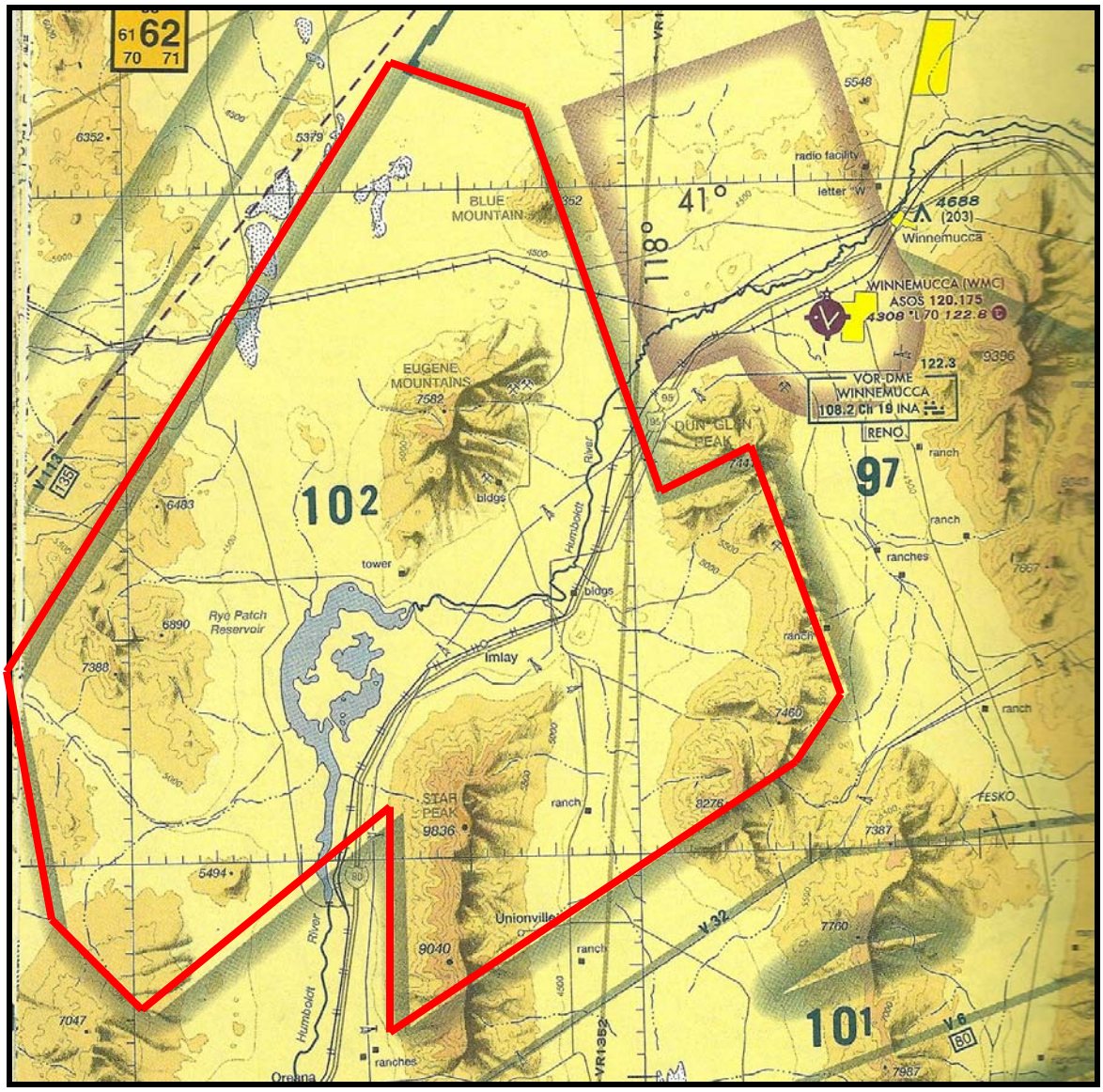
(Incidentally, the point from which the five arrows originate in the illustration just above is one mile north of the Hilton Ranch airport, which features a 9,000-ft **paved** runway, suitable for business jets and Nimbus 4s, parallel to the highway. It isn't depicted on the sectional chart at all.)

To illustrate the use of shading, here's an example from the area surrounding Rye Patch Dam, a commonly-used turnpoint northeast of Air Sailing:



Notice the spacing of the contour lines on Star Peak: about the same on both east and west slopes of the mountain. However, due to the shadow convention, the western slopes do not have the shading the east slopes have. The same is true for the Eugene Moutains, twenty miles north of Star Peak. The moral of the story is that the sectional can't give you any information about the steepness of the western slopes except by means of the spacing of the contour lines.

Another unusual feature of the Great Basin is the extent of Class G airspace. This can extend from the surface all the way up to a surprising altitude. Take another look at the last example, the region surrounding Rye Patch Dam:



The airspace within the red box is Class G airspace. Question: if you were soaring at 11,000 feet msl directly over Star Peak (elevation 9836 ft), what would your legal visibility and cloud clearance requirements be?

Another question: what would these limits be for any other aircraft in your vicinity—such as Navy jets out of NAS Fallon (the current "Top Gun" school)? And what speed limit would apply to these aircraft?

This Class G airspace extends from the surface to the base of Class E airspace at 14,500 feet msl...Out here, it's still the Wild West. Keep your eyes open!

While we're discussing airspace, consider this restricted area:

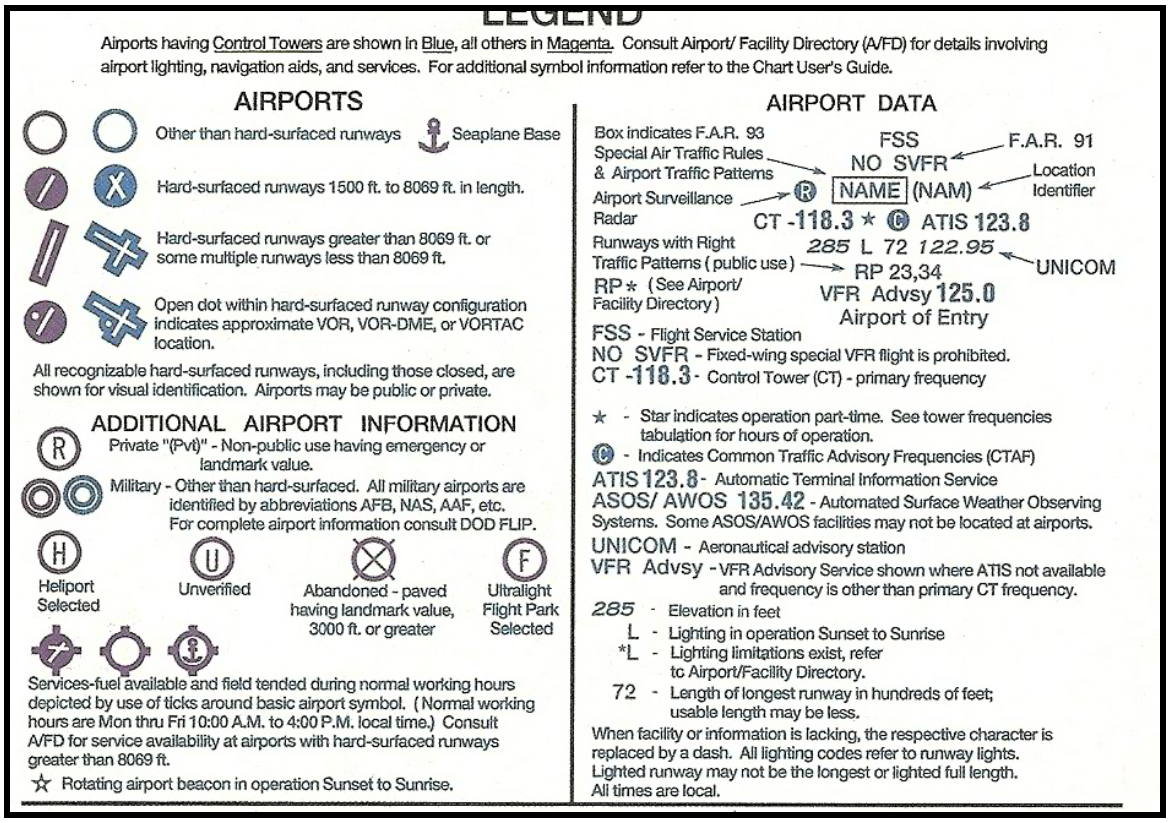
It's a seldom-used rocket motor test site south of Hawthorne, NV. (The desert seems to attract all sorts of oddball schemes and ideas.)

R-4811 extends from the surface to 15,000 feet msl. In many parts of the country, glider pilots must remain entirely clear of the lateral confines of any restricted area or other specia-use airspace. But in the Great Basin, many—though certainly not all—of these areas can be easily topped, and in fact most of the time glider pilots simply fly over, not around, R-4811.

In a similar way, the Class C airspace surrounding Reno's primary airport extends to only 8,400 feet msl. In many parts of the country, this altitude would be well above the top of the lift—but in the Great Basin we are normally well above this altitude and can simply overfly Reno's Class C. (Remember that unless you have a working transponder, you must remain above 10,000 feet to overfly any Class C airspace.)

The moral of the story is that you must check the table in the margin of the sectional for effective times and altitudes for all special-use airspace near where you plan to fly. You don't want to fly anywhere you shouldn't be—but by the same token, you don't want to unnecessarily avoid the lateral limits of this airspace and thus deprive yourself of the safest route or the best lift.

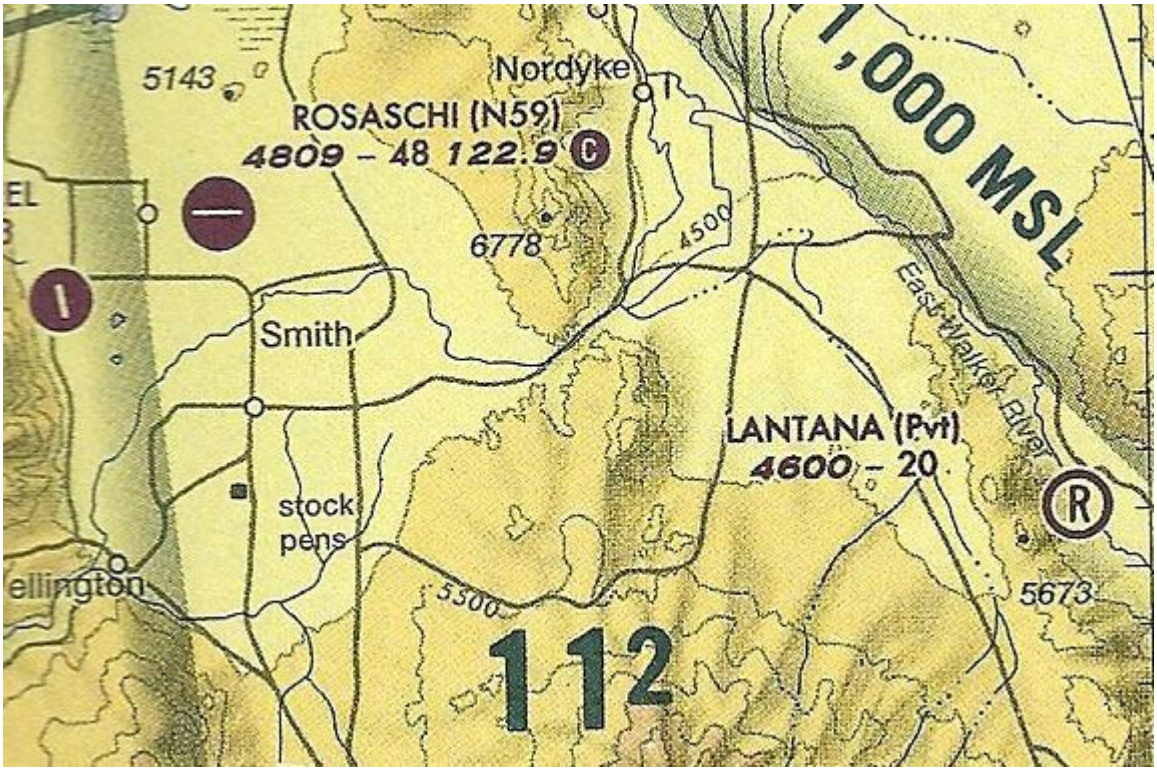
Next, let's look at airports and the way they're depicted on sectionals.



Four small ticks arranged around the basic airport circle symbol mean that "services" are available at this airport—these "services" are supposed to include at least the availability of fuel (useful if you intend to use an aerotow retrieve to get home) and "field attended during normal working hours." This could be significant to you if you land out on a windy day; unassisted, you might find yourself unable to prevent the wind from picking up and overturning your glider after you climb out of it! (A 1-26 stalls at 28 mi/hr at its maximum gross weight, but once you climb out and the tail settles to the ground, at the standard empty weight of 380 lb the 1-26 will lift off at about 20 kt!) If you land somewhere where there is no assistance available, you may be in for a lengthy sit in the cockpit. Similar considerations apply when flying a glider equipped with a canopy that isn't connected to the airframe with a hinge.)

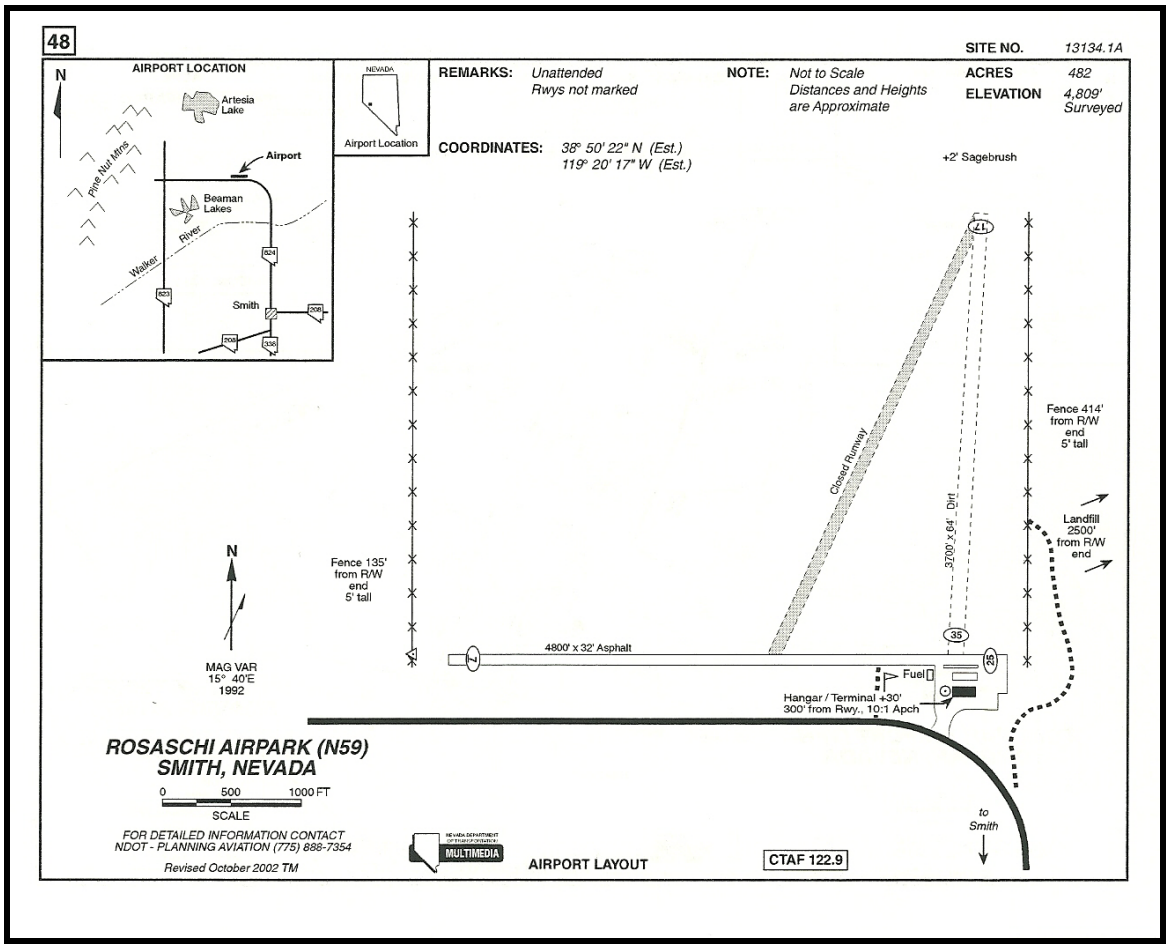
Looking at the sectional, you'll notice that very few airports in the Great Basin are attended. Most are just empty, windswept patches of land that somebody once scraped clear of sagebrush...always carry your own tiedowns.

Notice that hard-surfaced runways aren't depicted at all unless they're at least 1500 feet long. Air Sailing, for example, is located by a simple circle, even though our Runway 17/35 is over 7,000 feet long--because the pavement on it is only 1200 feet long. Confusing? It gets worse!



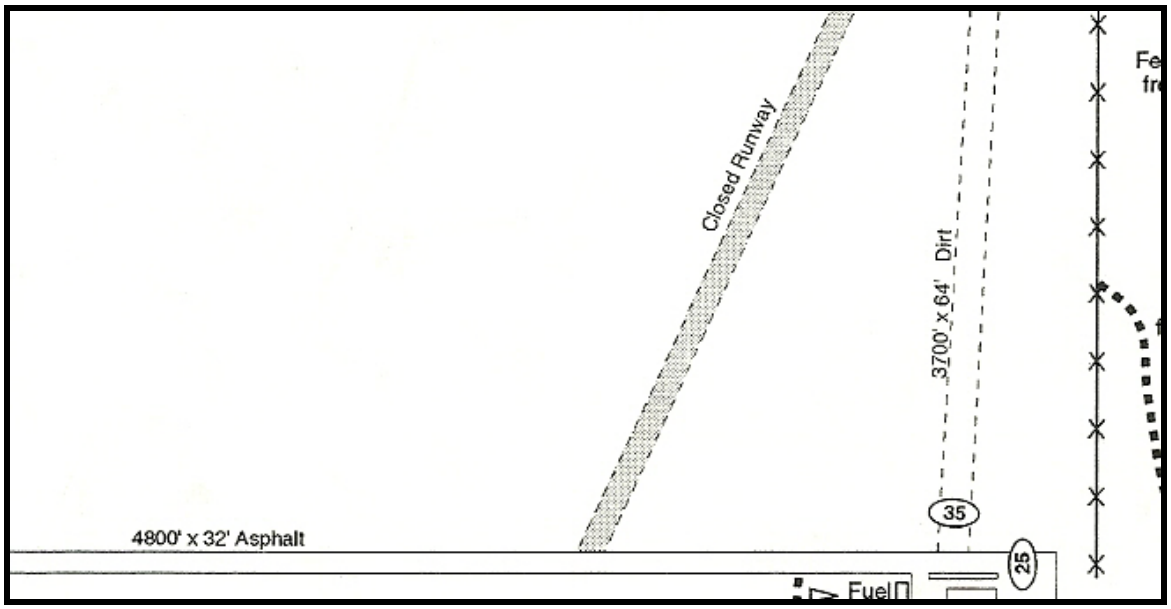
The airport symbol for Rosachi depicts an east-west runway and indicates a runway length of 4800 feet. (The sectional chart rounds runway lengths to the nearest hundred feet, downward from 70 feet and upward from 71 feet. So we know the runway at Rosachi is at least 4771 feet long.) Suppose you were looking for this airport. What would you expect to see?

Here's how the same airport is depicted in the airport directory published by the Nevada Department of Transportation:



Notice that there is not just the one (paved) runway depicted on the sectional, but a total of three runways—one of which is closed. A note at the top of the diagram tells us that the runways aren't marked. All in all, it might be difficult to reconcile the appearance of this airport with the information on the sectional.

Let's take a closer look at this diagram:



Notice that the paved runway—the ONLY runway depicted on the sectional—is indeed 4800 feet long, but is only 32 feet wide! A 15-meter wing is over 49 feet from tip to tip, and even a 1-26 spans 40 feet.

The north-south dirt runway is only 3700 feet long—which is plenty of runway for a glider, though more than 1000 feet shorter than the runway which is paved and depicted on the sectional—but it is 64 feet (a little over 19 meters) wide. Which runway would you choose?

Sectional charts provide NO information about runway widths.

In many parts of the country, this really isn't very significant: the local vegetation obligingly bends as the wing passes over it. Sage and rabbit brush are another story entirely, and should be treated as obstacles that would preclude a safe landing. In the Great Basin, runway widths are critical! This is part of the reason we so often prefer to land in dry lake beds.

Remember, many pilots are taught to make their runway selections solely on the basis of surface wind direction. That approach won't work here. In the Great Basin, winds are often secondary factors, and take a back seat to considerations such as runway width, runway slope, and nearby terrain obstacles.

At many airports in the Great Basin, nearby terrain obstacles also cause runway patterns to be designated as right traffic. This will appear on the sectional as a notation "RP" (Right Pattern) followed by one or more runway numbers. This is much more common here than in most other parts of the country.

For any airport, the airport elevation listed on the sectional is the highest point on a usable runway of the airport. In the Great Basin, the "flat" portions of the terrain are often alluvial fans on the valley floors. These are often far from level! Before beginning any approach to a strange airport, make a point of assessing the terrain around the airport and determining the slopes of the various runways. (This slope may well vary along the length of a single runway.) Making this assessment takes a certain amount of practice, so the sooner you get into the habit the sooner you'll develop the necessary proficiency…and bear in mind that the same terrain evaluation must be accomplished prior to any successful off-field landing, too!

Finally, it's worth noting that back-country airport data shown on the sectional is often hopelessly out of date. Airports with the special Glider symbol often haven't had glider operations for years, if not decades—so don't plan on getting a tow anytime soon! Don't plan on using Private or Restricted airports as potential safe outlanding sites without timely information at hand. It's good practice to devote non-soaring days to exploring the country on foot or by automobile—with particular attention to the terrain over which you plan to fly in the near future. These trips are always a lot of fun, and will make your future cross-country flying both more safe and more enjoyable.

Summary

The broad regions of colors indicate terrain elevations—NOT vegetation or other surface features.

For the elevations that matter to us, these color boundaries occur at odd thousands (feet above sea level.)

There is much more Class C airspace here, extending to much higher altitudes. Special-use airspace may sometimes be safely overflown.

Expect to be on your own after landing—assistance may be non-existent. Have a plan for securing the ship after landing.

Most of the runways here are unpaved and therefore not depicted on the sectional.

Runways widths are critical considerations and NEVER depicted on sectionals. Runway slopes are never depicted, either.

There is no substitute for current, local information—most of which can't be found on a sectional (or in a GPS database!)